



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/539,743

02/13/2006

Hoo-Geun Lee

29347/50809

5025

4743

7590

05/07/2008

MARSHALL, GERSTEIN & BORUN LLP
233 S. WACKER DRIVE, SUITE 6300
SEARS TOWER
CHICAGO, IL 60606

EXAMINER

SHEVIN, MARK L

ART UNIT

PAPER NUMBER

1793

MAIL DATE

DELIVERY MODE

05/07/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/539,743	Applicant(s) LEE ET AL.	
	Examiner Mark L. Shevin	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 19-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>See Continuation Sheet</u> . | 6) <input type="checkbox"/> Other: _____ |

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :01/22/2007
09/27/2006 06/20/2005.

DETAILED ACTION

Status

1. Claims 1-30, filed as a preliminary amendment on July 17th, 2006, are pending.

Restriction

2. Applicant's election of group I, claims 1-18 in the reply filed on April 28th, 2008 is acknowledged. Claims 19-30 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention.

Priority

3. Applicants' claims to priority of Korean patent applications 10-2002-008210 and 10-2002-0085858, filed December 21, 2002 and December 28, 2002, respectively are recorded.

Information Disclosure Statements

4. The information disclosure statements (IDS) submitted January 22nd, 2007, September 27th, 2006, and June 20th, 2005 are in compliance with the provisions of 37 CFR 1.97. Accordingly, these information disclosure statements have been considered by the examiner. Please refer to applicants' copy of the 1449 submitted herewith.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. **Claims 1-4, 6-7, and 9-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** (US 6,277,324) in view of **Hofmann** (US 3,897,183 A1) and **Fayed** (Rolling Pressing, in *Handbook of Powder Science and Technology*, 2nd Ed., edited by M.E. Fayed and L. Otten, 1997, ch. 6, p. 345-363.)

Joo

Joo, drawn to an apparatus and method for manufacturing molten pig iron, teaches producing reducing material of mixed hot fine direct iron and calcined additives from multiple fluidized beds (col. 2, lines 17-34).

A briquetting device, **16**, receives calcined additives such as lime and reduced iron, to roll press (col. 5, lines 1-8, col. 7, lines 38-43) these components to form into compacted material.

The reduced iron and calcined additive are charged into a melter-gasifier **31** to be manufactured into a molten iron (col. 10, lines 27-38) by injecting oxygen (Figs. 3-5 and col. 12, lines 13-25) into a coal packed bed (col. 10, lines 39-42).

Joo does not teach forming grooves on the pressed surfaces, crushing the compacted material, charging the crushed compacted material to coal-packed bed, or the geometry of the roll pressed compacts.

Hofmann

Hofmann, drawn to a method of roll pressing or briquetting, teaches producing briquettes from direct reduced iron in sheets of D-shaped pillows / lumps through the use of roll pressing. The lumps are interconnected by lands because the high pressures required by rolling make it necessary to have some clearance between the rolls (col. 1, lines 5-20). The rolled sheet product of direct reduced iron fines (col. 2, lines 29-31) is shown in figures 3 and 4. Grooves are formed on the pressed surfaces are shown in Fig. 4. The shape of the briquette shape is designed easily break and separate the briquettes from one another during crushing as shown in Fig. 1.

Any compacts that are not first crushed are recycled to be crushed again to reduce them to the proper size (col. 5, lines 1-10).

Fayed

Fayed, drawn to the principles and processes of double roll pressing, teaches after forming briquettes or compacts in the form of a sheet, these sheets are crushed and screen to yield a granular product (p. 345, col. 2, paras 1-2).

The pocket / mold shape is crucial in roll pressing in terms of gas release, release of the formed compacts, and the density of the final product (p. 361, col. 1, paras 1-3).

Fayed also teaches that the roll gap and thus the thickness of the roll pressed sheet produced, is a result effective variable (p. 352, col. 1, para 6 - p. 353, col. 1, para 1).

Shallow pockets improve deaeration (p. 356, col. 1, para 2).

Regarding claims 1, 9 and 10 it would have been obvious to one of ordinary skill in metallurgy, at the time the invention was made, taking the disclosures of Joo, Hofmann, and Fayed as a whole, to incorporate the briquette shape of Hofmann and the crushing step as taught by both Hofmann and Fayed for the following reasons. The briquette shape of Hofmann allows the easy separation of briquettes by crushing the sheet to as taught by Hofmann. Fayed adds that the pocket shape, and thus shape of the briquette is critical in the process of roll pressing and that shallow pockets improve deaeration. The briquette sheet is then crushed as taught by both Hofmann and Fayed to obtain material of a chosen size.

With respect to the briquette shape of claims 1, 9, and 10, Fig. 4 of Hofmann shows a sheet profile where the grooves on a first surface are positioned between two adjacent grooves of second surface.

Regarding claim 2, Fayed teaches that to obtain positive feed pressure and provide a more versatile means of control, screw feeders should be used (p. 346, col. 2, para 2) such as those with inclined screw feeders as shown in Figure 6.183(b) on p. 347, col. 1. Such screw feeders produce precompaction pressure that may be optimized (p. 355, col. 1, para 2).

Regarding claim 3 and 15, Hofmann's sheet was between 0.1" (2.54 mm) and 1" (25.4 mm) thick (col. 3, lines 22-26) and the density will be a function of the rolling speed, roll diameter, and a host of other factors as taught by Fayed.

Regarding claims 4 and 16-18 Joo teaches that the iron agglomerates are between 8 and 35 mm and that the coal in the coal packed bed is between 8 and 50

Art Unit: 1793

mm. MPEP 2144.05, para I states: "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists."

Regarding claim 6, Hofmann teaches that any compacts that are not first crushed are recycled to be crushed again to reduce them to the proper size (col. 5, lines 1-10).

Regarding claim 7, Hofmann teaches that when processing such hot reactive materials, an inert atmosphere, such as nitrogen, is needed (col. 2, lines 29-34).

Regarding claim 11, Joo teaches mixing hot calcined additives such as calcined lime from multiple fluidized beds with fine direct reduced iron (col. 2, lines 17-34).

Regarding claim 12, Joo teaches that about 360 Kg of lime stone is required to produce one ton of molten iron and Joo thus teaches the amount of lime and the resultant quick lime (CaO) as a result effective variable in the production of heat and CO₂ gas that is discharged to the fluidized beds and one of ordinary skill would select the claimed range of additive content through routine experimentation.

Regarding claim 13, Hofmann teaches that his briquetting process is conducted between 1000 and 2000 °F (538 – 1093 °C) and MPEP 2144.05, para I states: "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists."

Regarding claim 14, Hofmann teaches that his roll press uses a pressure of between 20 and 350 tons and the Examiner holds that this range, when converted to bar, overlaps the claimed range.

6. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** in view of **Hofmann** and **Fayed** as applied to claims 1-4, 6-7, and 9-18 above, in further view of **Freytag** (US 6,074,456).

The disclosures of Joo, Hofmann, and Fayed were discussed above, however none of these references taught the additional steps of bypassing the crushed compacted material, cooling, and subsequent storage.

Freytag

Freytag, drawn to a process for hot briquetting granular sponge iron (direct reduced iron), teaches that by cooling (**10**) the hot briquettes after formation in a roll press, wear on subsequent process equipment can be minimized (col. 1, lines 52-68) In particular, classified / size separation devices have unnecessarily high wear when processing materials at a high temperature. Furthermore, protective gas is not needed during temporary storage (col. 2, lines 1-6).

Regarding claim 5, it would have been obvious to one of ordinary skill in metallurgy, at the time the invention was made, to incorporate the hot briquette cooling method of Freytag into the process of Joo, Hofmann, and Fayed as Freytag teaches that cooling briquettes reduced wear on subsequent processing equipment and allows storage without protective gas.

7. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** in view of **Hofmann** and **Fayed** as applied to claims 1-4, 6-7, and 9-18 above, in further view of **McClelland** (US 6,352,573).

The disclosures of Joo, Hofmann, and Fayed were discussed above, however none of these references taught additional steps of wet scrubbing dust particles collected in each step and discharging the dried dust particles to the outside.

McClelland

McClelland, drawn to an improved method for separating and recycling hot fines produced in the hot briquetting of reduced iron (col. 1, lines 12-15), teaches that fines are especially produced during the breaking or crushing operation after roll pressing reduced iron (col. 1, lines 26-37). The fines should be removed and recycled in an economically feasible way (col. 1, lines 35-36) even though they are somewhat dangerous due to their pyrophoric nature (col. 1, lines 50-53).

Fines are removed after briquetting by pulling gas from the briquetting machine fines separator **16** to a wet scrubber **18** where it is compressed and reintroduced into the briquetting machine housing through inlet nozzle **36** (col. 4, lines 1-22 and claim 1).

Regarding claim 8, it would have been obvious to one of ordinary skill in metallurgy, at the time the invention was made, to incorporate the wet scrubbing process of McClelland into the process of Joo, Hofmann, and Fayed, as McClelland teaches that his recycling process has only one moving part, the blower, favorably recycles inert gases back to the briquetting machine, and allows for selective classification of fine particles to be removed (col. 4, lines 60-67).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Lee US 2007/0235909 A1, US 2007/0216072 A1

Art Unit: 1793

Kang (C.O. Kang, Prospects of Finex Process, *Metals* 2004, Kokata, India, November 4th, 2004, p. 1-12).

-- Claims 1-18 (All elected) are rejected

-- No claims are allowed

The rejections above rely on the references for all the teachings expressed in the text of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588. The examiner can normally be reached on Monday - Thursday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark L. Shevin/

/Roy King/

Art Unit: 1793

Supervisory Patent Examiner, Art Unit 1793

10-539,743
May 1st, 2008